

Claims

1. A method of preparing samples for analysis, comprising the steps of :

- 5 - injecting at least one liquid in individual columns of a movable plate by means of at least one movable injection needle;
- displacing said plate between at least two operational positions by displacing said at least one needle while said at least one needle is in a
10 relationship of at least indirect mutual engagement with said plate;

characterised by said mutual engagement being performed between said needles and engagement formations outside said columns.

15 2. A method according to claim 1, characterized in that said mutual engagement being realized between a tip of said needle and a recess which is in driving relationship with said plate.

3. A method according to claim 1 or 2, characterized in that for different movements of said plate, said mutual engagement
20 is performed at different locations with respect to the plate, respectively.

4. A method according to claim 2, characterized in that for different movements of said plate, said mutual engagement is performed between said tip and different recesses,
25 respectively.

5. A method according to claim 3, characterized in that said mutual engagement is performed between said needle and a carriage supporting said plate, and the method comprises the step of causing the carriage to slide horizontally from one to
30 the other of two underlying receptacles.

6. A method according to claim 5, characterized by said mutual engagement being performed along an edge of said carriage which is transverse to sliding direction of said carriage.

35 7. A method according to claim 3, characterized in that said step of displacing is performed to cause a downward displacement of the plate against biasing springs, said mutual

engagement is performed between a tip of said needle and a plate lowering means, and said needle is moved axially downwards to urge said plate-lowering means downwardly.

8. A method according to claim 7, characterized in that said
5 mutual engagement is performed outside apertures which are provided through said plate-lowering means in registration with some of said columns.

9. A method according to one of claims 1 to 8, characterized by the steps of

- 10 - feeding each said column with a liquid by means of said at least one needle while the columns are open upwardly;
- displacing said plate downwards into sealing engagement above an underlying receptacle;
- 15 - subjecting said receptacle to vacuum thereby to retain said plate in said sealing engagement and draw liquid from all said columns into said receptacle through a stationary phase provided in each column;
- 20 - releasing vacuum from said receptacle so as to release said plate from said sealing engagement.

10. A method of preparing samples for analysis comprising

- injecting a liquid in each column while the columns are open upwardly;
- 25 - displacing said plate downwards into sealing engagement above an underlying receptacle;
- subjecting said receptacle to vacuum thereby to retain said plate in said sealing engagement and draw liquid from all said columns into said
30 receptacle through a stationary phase provided in said columns;
- releasing said vacuum thereby to allow upward displacement of said plate out of said sealing engagement.

35 11. A method according to claim 10, characterized in that said receptacle is a collect receptacle having wells respectively corresponding to each column.

12. A method according to claim 10, characterized in that said receptacle is a drain receptacle, and wherein after release of said vacuum, said plate is moved to a position above a collect receptacle, and the steps of injecting a liquid, 5 displacing the plate downwards into sealing engagement, drawing liquid from all said columns simultaneously and releasing vacuum are reiterated above and in conjunction with said collect receptacle.

13. A method according to one of claim 10 to 12, 10 characterized in that at least one displacement of said plate is performed by bringing an injection needle into an at least indirect engagement with said plate and displacing said injection needle so as to drive said plate in said one displacement.

14. A method according to claim 13, characterized in that 15 said engagement occurs between said needle and a carriage supporting said plate, for an horizontal displacement of said plate.

15. A method according to claim 13, characterized in that 20 said engagement occurs between said needle and a plate-lowering means which is mounted above said plate.

16. A method according to claim 15, characterized in that the step of injecting liquid comprises liquid-injection through apertures which are provided through said plate-lowering means 25 in registration with some of the columns.

17. A rack for preparing samples for analysis, comprising:

- a frame;
- a sliding assembly which is mounted for sliding in the frame and is provided with a plate having a plurality of columns for receiving samples through 30 an upper opening of said columns;
- a first and a second receptacle mounted in the frame underneath the sliding assembly
- means for selectively connecting each said 35 receptacle with a vacuum source;

said sliding assembly being movable between a first position above said first receptacle and a second position above said

second receptacle, characterized by said sliding assembly being provided with engagement means for a needle, said engagement means being located outside said columns.

18. A rack according to claim 17, characterized in that said
5 sliding assembly comprises a carriage removably supporting said plate, and said engagement means are provided on said carriage.

19. A rack according to claim 18, characterized in that said carriage comprises a body having an upper edge extending along at least part of the periphery of the plate, and at least part
10 of said engagement means is provided on said upper edge.

20. A rack according to claim 19, characterized in that said engagement means comprise a row of recesses along a transverse edge belonging to said upper edge and extending transversely to the sliding direction of the carriage.

15 21. A rack according to claim 18, characterized in that said carriage comprises a body in which said plate is mounted for limited downward movement against biasing springs, and a pusher element which is mounted for vertical movement in abutment above said plate and is provided with at least part of said
20 engagement means.

22. A rack according to claim 21, characterized in that said pusher element is provided with apertures which register with some said columns underlying said pusher element.

23. A rack according to claim 21 or 22, characterized in that
25 said pusher element extends along a median line of the plate.

24. A rack according to one of claims 18 to 23, characterized by being adapted to be assembled by successive stacking of parts and to be disassembled by successively stacking off said parts thereby to allow quick extraction of used receptacles and
30 plate, and quick insertion of new receptacles and plate.

25. A device for preparing samples for analysis comprising :

- a rack according to one of claims 17 to 24;
- an injection unit in turn comprising :
 - i. an injection head provided with at least one
35 injection needle;
 - ii. an actuator for three-dimensional displacement of said injection head;

iii. control means for controlling said actuator whereby said head is successively brought in injection positions in which the needle registers with columns of said plate, and in plate-drive positions in which said needle registers with said engagement formations and then drives said plate for a predetermined displacement.

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